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UNSW
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Emerging Disruptive Technologies Assessment Symposium

Day Three Friday 17 July 2015

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09:10 Undersea Search and Sensors**Dr David Battle (DSTO)**

David Battle is head of the DSTO Unmanned Systems and Autonomy Group based at the Australian Technology Park in Sydney. David is an electrical engineer with a PhD in acoustic imaging from the University of Sydney. Following post-doctoral work at Scripps Institution of Oceanography in La Jolla California on geoacoustic characterisation of the seabed, he worked as a research engineer in the Laboratory for Autonomous Marine Sensing Systems at the Massachusetts Institute of Technology, where he was involved in some of the very early development of autonomous underwater vehicles and sensor payloads for military and civilian applications. In his current role, he is responsible for the development and evaluation of autonomous maritime capabilities for future application by the Royal Australian Navy.

09:30 Plenary - Incremental Steps to Full Autonomy**Mr Ron Allum - Deepsea Services**

Ron Allum has played a key role in some of the most daring and audacious explorations of our planet. In 1983 he was a dive leader on a world record 6.24 kilometre exploration of Cocklebidy Cave, which runs under Australia's vast Nullarbor Plain. He later joined a documentary team and went on to explore the cave systems of Mexico, Florida, the Bahamas and the Caribbean, and the ice caves of Alaska.

In 2001 he joined James Cameron's expedition team to *Titanic*, where his quiet manner and unique ability to adapt, design and build specialist equipment for use on Russian *Mir* submersibles earned him the title of "The Professor" aboard ship. Over the next four years his technical expertise was key to the success of Cameron's expeditions to the wreck of the *Bismark* (depth 4,796 metres) and the Mid-Atlantic and Pacific hydrothermal vents (1,000-4000 metres).

Ron commenced work on the *Deepsea Challenger* submersible in late 2005, researching and overseeing the building of the pressure sphere that forms its core. When the sphere was completed he went on to develop the syntactic foam that formed *Deepsea Challenger's* structural chassis and provided the vehicle's floatation. Allum's pressure-balanced, fluid-filled electronic systems and other innovative ideas kept the submersible's weight to a minimum while maximising its ability to conduct science and imaging work at the deepest points on earth. Following the expedition he established Ron Allum Deepsea Services to develop new concepts and design innovative vehicles for sub-sea exploration.

His extraordinary skills were recognised when he was awarded the New South Wales Senior Australian of the Year for 2012 in recognition of his outstanding contributions in the fields of engineering, science and exploration.

10:00 Robotic Systems: Autonomy, Collaboration and Physical Assistance

Dr Alen Alempijevic (UTS)

Alen Alempijevic received his B.Eng. Computer Systems Engineering with Honours and PhD degree from the University of Technology Sydney in 2004 and 2009 respectively. He was part of the Australian research team collaborating with University of California Berkeley enabling vehicle autonomy under the DoD sponsored DARPA Urban Grand Challenge.

He was a Research Fellow with the Australian Research Council (ARC) funded Centre for Autonomous Systems, which in 2010 was the second largest Robotics group in the world. Alen is currently a Senior Lecturer with the Centre for Autonomous Systems at UTS and a Principle Chief Investigator on several industry driven projects investigating the challenges of perception and application of artificial intelligence on infrastructure maintenance, underground coal mining, human-robot interaction and estimation of biological systems.

10:20 Trusting technology in a complex world

Dr Peter Dortmans (DSTO)

Dr Peter Dortmans commenced working for DSTO in 1999 in Land Operations Division. He has since undertaken a number of roles within DSTO supporting the Joint, Strategy and National Security domains. He was seconded to PM&C in 2009 to coordinate the development of the National Security Science and Innovation Strategy.

Recently, he was a coauthor on Forward 2035 – DSTO’s recent review of Megatrends and their implications for Defence. Peter has published work on emerging technologies and their implications in a number of journals.

Before joining DSTO, Peter undertook a PhD in Theoretical Physics at the University of Melbourne, following this with post-doctoral research in both Australia and Italy. Peter is currently completing a Masters in Strategic Studies at the ANU. Peter’s current role is as the Director National Security S&T Policy.

11:10 Panel Session - Trust in Autonomous Technology

Mr Tim McFarland (University of Melbourne)

Tim McFarland is a PhD candidate at Melbourne Law School and a member of the Program on the Regulation of Emerging Military Technology at the Asia Pacific Centre for Military Law. His supervisors are Professor Tim McCormack and Dr Rain Liivoja. His PhD research addresses the legal implications of utilising increasingly autonomous weapon systems in armed conflict. Tim's background is a mixture of technical and legal work, having earned a degree in mechanical engineering and working for several years in a variety of information technology roles before returning to university to complete a Juris Doctor degree at Melbourne Law School. After his JD studies he worked in the International Humanitarian Law department of Australian Red Cross before commencing full-time PhD studies.

Dr Brian Mekdeci (University of SA)

Dr. Brian Mekdeci is currently a Research Fellow at the Defence and Systems Institute, UNISA. He received a B.A.Sc. and M.A.Sc. in Systems Design Engineering from the University of Waterloo in Canada, and an Engineering Systems Ph.D. from M.I.T. in the United States. His research interests include critical systems, unmanned vehicles, trusted autonomy, simulation and modelling, serious gaming, and human factors.

Dr Jai Galliot (UNSW Australia)

Dr. Jai Galliot is a Research Fellow in Indo-Pacific Defence at the University of New South Wales, Kensington. His interests include the future of war and emerging military technologies, ranging from drones through to soldier enhancement and cyber systems. He has published a number of books, including *Military Robots: Mapping the Moral Landscape* (Ashgate 2015), *Super Soldiers* (Ashgate 2015), *Commercial Space Exploration* (Ashgate 2015) and *Ethics and Intelligence Collection* (Routledge 2015). Prior to entering academia, Galliot served as an officer in the Royal Australian Navy.

Prof R.E Burnett (National Defense University, USA)

Professor R. E. Burnett is a distinguished academic with the College of International Security Studies at the National Defense University.

His career began in 1986 with a BA in Political Science from the University of Missouri-Columbia followed in 1986 with a MA in International Affairs and International Science & Technology Policy from George Washington University. Professor R.E. Burnett received his PhD in political science and Philosophy of Science in 1993. Since that time he has had a distinguished career in the field of National Defense, Science & Technology, Biodefense, and Diplomacy and International Commerce.

He is an analyst and theoretician in the field of emerging technologies who has recently been a featured speaker and researcher to the National Intelligence Council's science and technology committee. Professor R.E. Burnett's research interests are Emerging and Disruptive Technologies, National Security, International Security, Science and Technology Policy, and National Security and Ethics.

Dr Jason Scholz (DSTO)

Dr Jason Scholz leads research for around fifty science and technology staff in cognitive psychology, decision aids, decision automation/autonomy, and the integration of human and machine decision-making in the Decision Sciences branch across three states. He also chairs an International five-eyes science and technology (Technical Cooperation Program or TTCP) strategic challenge group in Autonomy, and leads the DSTO-wide strategic research initiative in Trusted Autonomous Systems.

He provides scientific leadership through invention, innovation, technology prototypes, risk assessments and advice on new and in-service Command and Control (C2) capabilities to the

Department of Defence and National Security organizations to improve C2 for operational and strategic headquarters, national security, joint logistics and preparedness.

Jason holds a Bachelor of Engineering in Electronic Engineering from the University of South Australia a PhD in Electrical Engineering from the University of Adelaide. He has over 50 refereed publications and several patents, covering research in telecommunications, digital signal processing, artificial intelligence and human decision making, all with a unifying theme of "decision and control". In 1994, he was attached to the Information Directorate of the C3I Division of the US Airforce Rome Laboratory in New York. He received an achievement award for the Allied Command & Control Operations and Research Demonstrator (ACCORD) test bed in the TTCP C3I Group.